

Association Between Smartphone Use and Health Related Physical Fitness among Undergraduate Physiotherapy Students of Kathmandu University School of Medical Sciences, Dhulikhel, Nepal

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ABSTRACT

Background: The prevalence of smartphone addiction among young adults, particularly within university populations, has emerged as a significant public health concern due to its association with sedentary behavior and increased risk for non-communicable diseases (NCDs). Given that the physiotherapy profession is inherently physically demanding requiring practitioners to maintain a high level of physical fitness to effectively perform clinical assessments and therapeutic interventions. It is imperative to investigate whether excessive smartphone use compromises the health-related physical fitness (HRPF) of students training in this field. This study aims to examine the association between smartphone use, both in terms of addiction status and daily usage duration, and HRPF components among undergraduate physiotherapy students at Kathmandu University School of Medical Sciences (KUSMS), Dhulikhel, Nepal.

Methods: A cross-sectional study design was employed, with an initial sample of 115 participants; six were subsequently excluded due to incomplete data, resulting in a final analytic sample of 109 students. Smartphone addiction was assessed using the validated Smartphone Addiction Scale -Short Version (SAS-SV). Health-related physical fitness was evaluated across five key domains: body composition (via skinfold thickness measurements), cardiorespiratory endurance (using the YMCA 3-minute step test), muscular strength (assessed by the push-up test), muscular endurance (measured by the partial curl-up test), and flexibility (determined by the YMCA sit-and-reach test). Data analysis included descriptive statistics, chi-square tests for categorical associations, and Spearman's rank correlation coefficients to examine relationships between continuous variables, with statistical significance defined as $p < 0.05$.

Results: The results indicated a high prevalence of smartphone addiction, affecting 45.9% of the participants. Performance on HRPF components revealed suboptimal outcomes in body composition (48.6%), cardiorespiratory endurance (52.3%), and flexibility (61.5%). In contrast, muscular strength was rated as average in 57.8% of students, while muscular endurance was classified as excellent in 70.6%. Notably, no statistically significant association was found between smartphone addiction status and any of the five HRPF components ($p > 0.05$). However, a significant negative correlation was observed between the daily duration of smartphone use and three specific fitness parameters: muscular strength ($r = -0.24, p = 0.01$), muscular endurance ($r = -0.22, p = 0.02$), and flexibility ($r = -0.19, p = 0.04$).

Conclusion: A substantial proportion of physiotherapy students exhibit smartphone addiction, and most health-related physical fitness components are below average, potentially compromising health and increasing the risk of future musculoskeletal injuries.

Keywords

Smartphone addiction, Smartphone use, Physical fitness, Physiotherapy students, Smartphone addiction scale.

Introduction

Smartphone addiction is characterized by persistent and excessive smartphone use despite negative consequences, reflecting impaired control over usage [1]. Over the past decade, smartphones have evolved from basic communication devices into multifunctional tools that provide access to the Internet, gaming, photography, music, and online shopping. While these features offer convenience, they have led to a substantial increase in smartphone use, particularly among young adults. Young adulthood, defined as the age range of 18–24 years, represents a transitional phase between adolescence and full adulthood.

Individuals with smartphone addiction commonly experience symptoms such as compulsive use, disruption of daily activities, and neglect of adverse outcomes, which resemble features of substance-related and addictive disorders described in the DSM-5 [2].

In Nepal, the number of mobile phone users exceeded 38.21 million by mid-January 2021, as reported by the Nepal Telecommunications Authority [3]. Evidence from global studies indicates a high prevalence of smartphone addiction among children, adolescents, and college students, who frequently use smartphones for communication, academic activities, and entertainment [4]. Research suggests that college students spend an average of nearly 9 hours per day on their smartphones [5]. A study conducted among medical students in Chitwan reported a smartphone addiction prevalence of 36.8%, which is higher than the global prevalence of internet addiction among medical students [4,6].

Excessive smartphone use has been associated with reduced physical activity and diminished physical fitness. Smartphone addiction in young adults is linked to sedentary behavior, increasing the risk of metabolic disorders such as obesity, hypertension, and hyperlipidemia [7]. Physical inactivity is a major risk factor for non-communicable diseases, including cardiovascular disease, diabetes, certain cancers, mental health disorders, and premature mortality [8]. Reduced walking and energy expenditure associated with smartphone overuse contribute to decreased muscle mass and increased fat accumulation [9].

The World Health Organization recommends that adults aged 18–64 years engage in 150–300 minutes of moderate-intensity or 75–150 minutes of vigorous-intensity aerobic physical activity per week; however, 25% of adults and 81% of adolescents fail to meet these guidelines [10]. Sedentary behavior is associated with reduced muscle strength, endurance, cardiorespiratory fitness, and increased adiposity [11].

Physiotherapy is a physically demanding profession that requires adequate strength, endurance, and overall fitness [12].

Physiotherapists routinely perform patient lifting and transfers, apply physical resistance during assessments and treatments, and prescribe exercises to patients and athletes [13]. Higher body mass index (BMI >25 kg/m²) has been associated with an increased prevalence of musculoskeletal disorders among physiotherapists [14]. Studies indicate that up to 70.1% of physiotherapy students experience musculoskeletal pain after entering the profession, with a proportion sustaining their first injury during their student years [15,16]. Therefore, improving physical fitness during the training period is essential to reduce the risk of future musculoskeletal injuries. So this study aims to examine the association between smartphone use, both in terms of addiction status and daily usage duration, and HRPF components among undergraduate physiotherapy students at Kathmandu University School of Medical Sciences (KUSMS), Dhulikhel, Nepal.

Methods

A cross-sectional study was conducted among undergraduate physiotherapy students at Kathmandu University School of Medical Sciences (KUSMS), Dhulikhel, Nepal between March and December 2023. A census sampling method was employed, and 115 students were initially recruited. Of these, six students were excluded for not meeting the inclusion criteria, resulting in a final sample of 109 participants.

Smartphone addiction was assessed using the Smartphone Addiction Scale–Short Version (SAS-SV), a validated questionnaire designed for young adults. The scale consists of 10 items rated on a 6-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree). Gender-specific cutoff scores were applied, with scores >31 indicating smartphone addiction in males and >33 in females.

Physical fitness was evaluated using standardized tests corresponding to different components of health-related fitness. Body composition was assessed using the skinfold caliper method. Cardiorespiratory fitness was measured using the YMCA 3-minute step test. Muscular strength, muscular endurance, and flexibility were assessed using the push-up test, partial curl-up test, and YMCA sit-and-reach test, respectively.

Ethical approval for this study was obtained from the Institutional Review Committee of Kathmandu University School of Medical Sciences. IRC – KUSMS 111/23. Written informed consent was obtained from all participants prior to data collection. Inclusion criteria comprised undergraduate physiotherapy students aged 18 years or older, enrolled at KUSMS, and current smartphone users. Students who declined participation, had contraindications to exercise or exercise testing, or had musculoskeletal pain or injuries that could affect test performance were excluded. Each participant was assigned a unique identification code to maintain confidentiality. Data were collected after providing participants with an information sheet and obtaining informed consent.

All data were anonymized and entered into the Statistical Package for the Social Sciences (SPSS) version 25.0 for analysis. Descriptive statistics, including mean and standard deviation,

were calculated for continuous variables, while frequencies and percentages were computed for categorical variables. Data normality was assessed using the Kolmogorov Smirnov test, with $p > 0.05$ indicating normal distribution. Associations between dependent and independent variables were analyzed using the Chi-square test and linear-by-linear association, with statistical significance set at $p < 0.05$.

Results

A total of 109 undergraduate physiotherapy students participated in the study (Table 1). The mean age was 21.36 ± 1.44 years (range: 18–25 years) with females constituting the majority (88.1%). Most participants were enrolled in the first year of the Bachelor of Physiotherapy program (36.7%). Based on BMI classification, 63.3% of students had normal body weight, while 22.9% were underweight and 13.8% were overweight.

Table 1: Descriptive characteristics of participant (n=109).

Variables	Mean (SD)
Age	21.36 ± 1.44
Gender	Frequency n (%)
Male	13(11.9)
Female	96(88.1)
Batch	
BPT 1 st year	40 (36.7)
BPT 2 nd year	22 (20.2)
BPT 3 rd year	19 (17.4)
BPT 4 th year	28 (25.7)
BMI	
Underweight	25 (22.9)
Normal	69 (63.3)
Overweight	15 (13.8)

Table 2: Descriptive characteristics of SAS-SV.

		Mean (SD)	
Smartphone Addiction Scale-Short version (SAS-SV)		30.56 ± 7.43	
		Low risk of smartphone addiction, N (%)	High risk of smartphone addiction, N (%)
Gender	Male	7 (53.8)	52(54.2)
	Female	6(46.2)	44 (45.8)
BMI	Underweight	17 (68.0)	8 (32.0)
	Normal	35 (50.7)	34 (49.3)
	Overweight	7 (46.7)	8 (53.3)
Batch of participants	BPT 1st year	26 (65.0)	14(35.0)
	BPT 2nd year	11 (50.0)	11 (50.0)
	BPT 3rd year	7 (36.8)	12 (63.2)
	BPT 4th year	15 (53.6)	13 (46.4)
		Total Participants, N (%)	
Low risk of smartphone addiction		59 (54.1)	
High risk of smartphone addiction		50 (45.9)	

Table 2 presents the descriptive characteristics of smartphone addiction among undergraduate physiotherapy students. Of the

109 participants, 45.9% were classified as high risk for smartphone addiction, while 54.1% were at low risk. A higher proportion of males (54.2%), overweight students (53.3%), and third-year BPT students (63.2%) fell into the high-risk category.

Figure 1 illustrates the health-related physical fitness profile of undergraduate physiotherapy students. The skinfold caliper test indicated poor body composition in a considerable proportion of both males (38.5%) and females (37.5%). Cardiorespiratory fitness assessed by the YMCA 3-minute step test was predominantly poor among males (53.8%) and females (57.3%), with only 5.2% achieving excellent scores. Push-up test results showed average muscular strength in most males (38.5%) and females (46.5%). In contrast, performance in the partial curl-up test was predominantly excellent among males (61.5%) and females (38.5%). Flexibility assessed by the YMCA sit-and-reach test was largely below average, particularly among females (38.5%) compared to males (30.8%).

Table 4 presents the association between smartphone addiction and health-related physical fitness. Chi-square analysis showed no statistically significant association between smartphone addiction and any component of health-related physical fitness ($p > 0.05$).

Table 4: Chi square test.

Health related physical fitness component	p-value
Body Composition	0.309
Cardio-respiratory endurance	0.280
Muscular Strength	0.609
Muscular Endurance	0.175
Muscular Flexibility	0.209

Statistically significant results are presented in bold (p -value < 0.05).

Table 5 shows the association between smartphone use duration and health-related physical fitness. Linear-by-linear association analysis revealed significant associations between smartphone use duration and muscular strength, muscular endurance, and flexibility ($p < 0.05$).

Table 5: Linear by linear association.

Health related physical fitness component	P-value
Body Composition	0.18
Cardio-respiratory endurance	0.19
Muscular Strength	0.01
Muscular Endurance	0.02
Muscular Flexibility	0.04

Statistically significant results are presented in bold (p -value < 0.05).

Discussion

This study examined the prevalence of smartphone addiction among undergraduate physiotherapy students at KUSMS and explored its association with health-related physical fitness and smartphone use duration. The main findings indicate no significant association between smartphone addiction and health-related physical fitness components. However, smartphone use duration

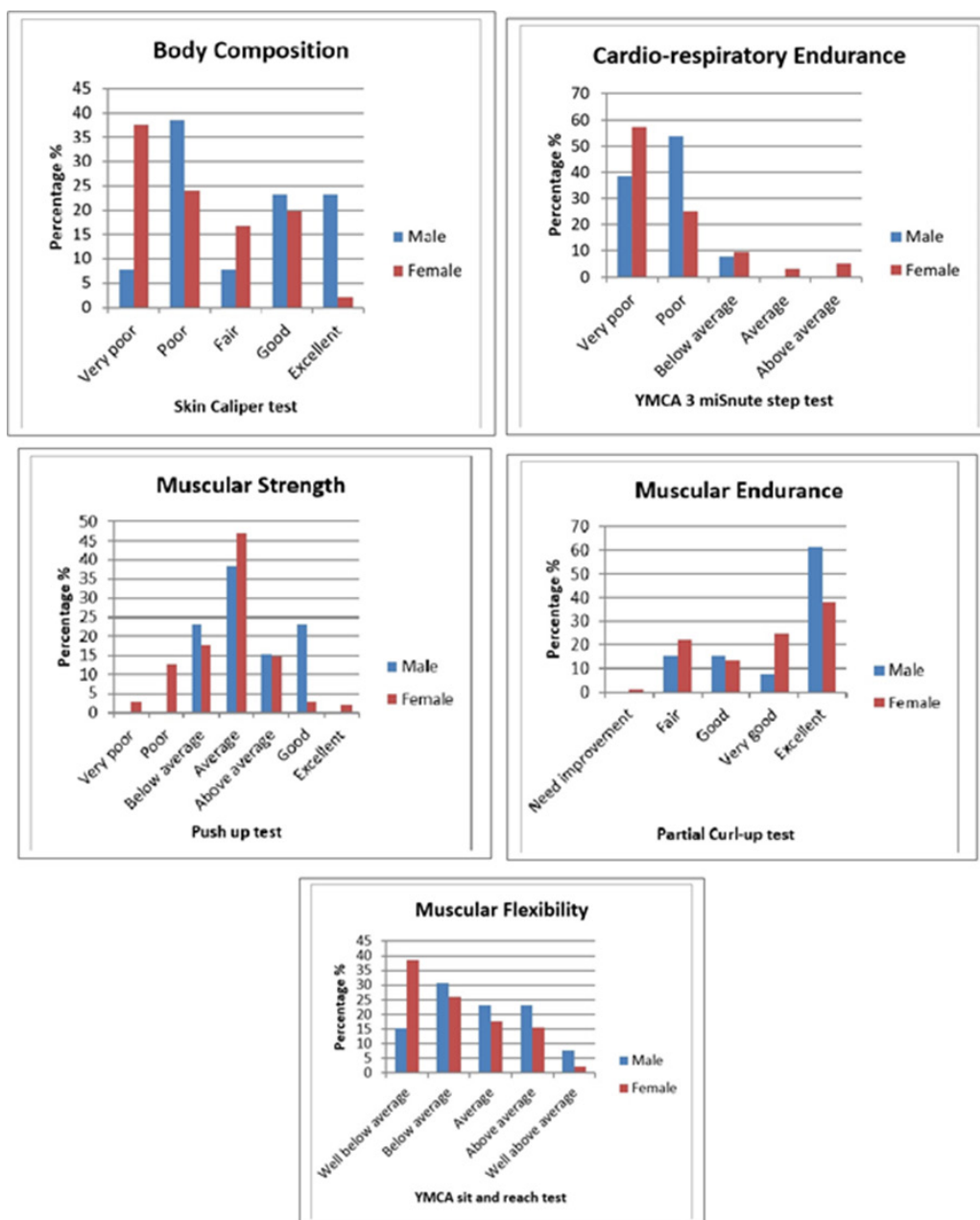


Figure 1: Showing Percentage distribution of component of health related physical fitness.

was significantly associated with muscular strength, endurance, and flexibility.

In the present sample, 45.9% of students were at high risk of smartphone addiction, while 54.1% were at low risk. Male students showed a higher risk (54.2%) compared to females. These findings are comparable to a study among physiotherapy students in Pakistan, where 44.5% were addicted and 63.8% of them were male [1]. Overweight students demonstrated a higher risk of smartphone addiction (53.3%), consistent with research conducted in Korea [2]. This may be attributed to reduced physical activity and lower daily energy expenditure associated with prolonged smartphone use, which can contribute to increased fat mass and decreased muscle mass [2].

Smartphone addiction was more prevalent among third-year students, similar to findings from medical students in India [3]. This may reflect academic workload and increased use of smartphones for assignments, presentations, and leisure. First-year students may use smartphones less due to adaptation to new academic demands, while final-year students may have limited leisure time due to extensive clinical duties.

Regarding physical fitness, the majority of students showed poor body composition and cardiorespiratory fitness, with females performing worse than males. This aligns with previous findings that males generally have higher muscle mass and lower fat mass and are more physically active than females [4-8]. Such trends are concerning in physiotherapy students, as the profession demands adequate fitness for patient handling and clinical duties [9,10].

Similar results have been reported among physiotherapy students in India and Malaysia [6,9].

Muscular endurance assessed by the partial curl-up test was predominantly excellent in both genders, contrasting with findings from Malaysia but consistent with results from Croatia [6,12]. Core strength is essential for maintaining posture and preventing lower back pain, particularly given the physical demands of physiotherapy training and clinical practice [13,14].

Upper limb strength was generally average among participants, which is comparable to findings from India. ¹⁴Given the manual nature of physiotherapy practice, suboptimal upper limb strength may increase the risk of musculoskeletal disorders due to repetitive tasks and prolonged awkward postures [14].

Flexibility was mostly below average, especially among female students. This is consistent with some previous studies [15]. but differs from others reporting excellent flexibility [16]. Reduced flexibility, particularly in the hips and lower back, is a known risk factor for low back pain and may affect clinical performance [17].

Although no significant association was found between smartphone addiction and physical fitness in this study, prior research has reported lower physical activity levels among high-risk smartphone users [18]. Prolonged smartphone use may reduce physical activity and energy expenditure, potentially leading to increased adiposity [18].

In contrast, smartphone use duration showed significant associations with muscular strength, endurance, and flexibility, supporting evidence that higher mobile phone use is related to lower physical fitness performance [19]. Prolonged smartphone use may also contribute to musculoskeletal symptoms and poor sleep quality, which can indirectly affect physical fitness [20,21].

Conclusion

Among undergraduate physiotherapy students, 45.9% were at high risk of smartphone addiction, with higher prevalence observed in males (54.2%), overweight students (53.3%), and third-year students (63.2%). Most participants demonstrated poor body composition, cardiorespiratory endurance, and flexibility, while muscular endurance was predominantly excellent. Smartphone use duration was significantly associated with muscular strength, endurance, and flexibility, whereas no significant association was found between smartphone addiction and health-related physical fitness.

Limitations

This study has several limitations. The sample was limited to physiotherapy students at KUSMS, resulting in a relatively small sample size and limited generalizability. Screen time was not measured directly by the outcome tool, and smartphone use duration was assessed using a separate question. Additionally, only health-related physical fitness components were evaluated, without consideration of other relevant factors such as mental

health or academic performance.

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